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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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18M2/1223

EXAMINER

BENZION, G

ART UNIT	PAPER NUMBER
1603	12

DATE MAILED: 12/23/97

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

<b>Office Action Summary</b>	Application No. <b>08/572,027</b>	Applicant(s) <b>Debono et al.</b>
	Examiner <b>Gary Benzion, Ph.D.</b>	Group Art Unit <b>1803</b>

Responsive to communication(s) filed on 14 Oct 1997

This action is **FINAL**.

Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire three month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

#### Disposition of Claims

Claim(s) 1-65 is/are pending in the application.

Of the above, claim(s) 47-54 is/are withdrawn from consideration.

Claim(s) \_\_\_\_\_ is/are allowed.

Claim(s) 1-46 and 55-65 is/are rejected.

Claim(s) \_\_\_\_\_ is/are objected to.

Claims \_\_\_\_\_ are subject to restriction or election requirement.

#### Application Papers

See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

The drawing(s) filed on \_\_\_\_\_ is/are objected to by the Examiner.

The proposed drawing correction, filed on \_\_\_\_\_ is  approved  disapproved.

The specification is objected to by the Examiner.

The oath or declaration is objected to by the Examiner.

#### Priority under 35 U.S.C. § 119

Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

All  Some\*  None of the CERTIFIED copies of the priority documents have been received.

received in Application No. (Series Code/Serial Number) \_\_\_\_\_.

received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\*Certified copies not received: \_\_\_\_\_.

Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

#### Attachment(s)

Notice of References Cited, PTO-892

Information Disclosure Statement(s), PTO-1449, Paper No(s). 5

Interview Summary, PTO-413

Notice of Draftsperson's Patent Drawing Review, PTO-948

Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

*Status of the Application*

Claims 1-65 are pending.

Applicant's election without traverse of Group I, drawn to the embodiment of isolated DNA encoding a mutant Δ-12 or Δ-15 fatty acid desaturase gene, in Paper No. 9 is acknowledged. In the previous Office Action claims 47 was stated to reside in both groups I and II which, by applicants election of the group by subject matter, has placed this claim in the non-elected group. Accordingly claims 1-46 and 55-65 are elected without traverse.

Claims 47-54 are withdrawn from further consideration as directed to a non-elected invention.

*New Matter*

The amendment filed 16 September 1997 is objected to under 35 U.S.C. § 132 because it introduced new matter into the specification. 35 U.S.C. § 132 states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: amendment as set forth in the preliminary amendment directed to changes in sequence data found at page 14, lines 21 and 22, and at page 25, lines 26 and 27 (Tables 1 and 2). In consideration of the facts placed in the record by applicant, there is no clear chain of custody linking the new sequence with that of the old, nor is it clear that the error was unambiguous – that is, could only be interpreted in the way in which applicants have, as the original sequence is just as supported by the specification as filed as that to which applicants wish to change. Accordingly the amendment constitutes new matter in the absence of a showing that the "correct" sequence was obtained from the same material via a clear chain of custody to an unambiguous source, such as a deposit of the original material from which the instant invention was obtained.

Applicant is required to cancel the new matter in response to this Office Action.

**35 U.S.C. § 101, Statutory Basis for Doubling Patenting.**

A rejection based on double patenting of the "same invention" type finds its support in the language of 35 U.S.C. § 101 which states that "whoever invents or discovers any new and useful process ... may obtain a patent therefor ..." (Emphasis added). Thus, the term "same invention" in this context,

means an invention drawn to identical subject matter. *Miller v. Eagle Mfg. Co.*, 151 U.S. 186 (1894); *In re Ockert*, 245 F.2d 467, 114 USPQ 330 (CCPA 1957); and *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970).

A statutory type (35 U.S.C. § 101) double patenting rejection can be overcome by canceling or amending the conflicting claims so that they are no longer coextensive in scope. The filing of a terminal disclaimer cannot overcome a double patenting rejection based upon 35 U.S.C. § 101.

*gfb*  
Claim 17 is rejected under 35 U.S.C. § 101 as claiming the same invention as that of claims 6 of prior U.S. patent No. 5,668,279. This is a double patenting rejection.

#### **Basis for Non-statutory Double Patenting (Obvious and Non-Obviousness Type)**

The non-statutory double patenting rejection, whether of the obvious-type or non-obviousness type, is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent. *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); *In re Van Ornam*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); and *In re Goodman*, 29 USPQ2d 2010 (Fed. Cir. 1993).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321 (b) and (c) may be used to overcome an actual or provisional rejection based on a non-statutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.78 (d).

*gjm*  
Effective January 1, 1994, a registered attorney or agent of record may sign a Terminal Disclaimer. A Terminal Disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 11-17, 19-26 and 35-46 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 6, 16-18, 20 and 21 of U.S. patent No. 5,668,279. Although the conflicting claims are not identical, they are not patentably distinct from each other because each is drawn to mutant *Brassica* or *Helianthus* plant which comprise altered fatty acid desaturase genes which confer altered levels of oleic and/or linoleic acid. While the prior patent is directed to specific plants described by the effect of the altered genes the instant is taught in terms of the mutants *per se*.

Thus the prior patent and the instant application comprise species of the genus of plants comprising altered levels of oleic and linoleic acid, thus comprise a single inventive concept and accordingly one invention.

**35 U.S.C. § 112**

Claims 1-46 and 55-65 are rejected under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The preliminary amendment submitted 16 September 1997 introduced changes to the specification at page 14, lines 21 and 22, and at page 25, lines 26 and 27 which have been summarized at Tables 1 and 2 of the amendment. Additionally, changes in the sequence listing as reflected in Tables 3-6 of the preliminary amendment are found not to be supported by the specification as originally filed. While it is noted that the sequence listings, which are germane to the subject matter of the claims, have not been amended to reflect the correct sequences found in Tables 3-6, these data newly proffered indicate that, at the time of filing, applicants did not have in their possession the claimed invention.

Claims 1-3, 5, 8-9, 12-15, 19, 27-29 and 34 are rejected under 35 U.S.C. § 112, first paragraph, first paragraph, because the specification, while being enabling for mutations in the 5 amino acid (aa) motif His Xaa Xaa Xaa His which results in non-functional Δ-12 and Δ-15 fatty acid desaturase genes from *Brassica* or *Helianthus*, does not reasonably provide enablement for mutations in other region which may results in loss of gene function or encompass the down or up regulation of said gene to increase oleic acid level or decrease in linoleic acid levels in the seed of plants comprising said genes. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make the invention commensurate in scope with these claims.

The specification disclose mutation that occur in the amino acid (aa) motif His Xaa Xaa Xaa His that result in the absence of function of the Δ-12 and Δ-15 fatty acid desaturase genes from *Brassica* or *Helianthus*. There is no teach of how to apply these specific mutation to other aa motifs or other conserved regions in these genes or which mutations (i.e., conversions, substitutions, inversion and the like) may be so employed. There is no linkage of the mutations exemplified in the specification with the

limitation to "at least 20 nucleotides" having "... at least one mutation" as found in claim 1, for example. While the degree of experimentation required for the person having skill in the art to determine the range of mutations in the *His Xaa Xaa Xaa His* motif which would function to "...renders the resulting desaturase gene product non-functional..." (page 18) is within the skill in the art and would not be undue experimentation there is no further teaching as to which other *aa* to mutate or modify which would function in the same manner as that taught in the specification. Clearly as required by the Forman analysis (*Ex parte Forman*, 230 USPQ 546 (BPAI 1986) such experimentation would be considered undue as there is no further guidance provided.

Claims 1-46 and 55-65 rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The claimed subject matter, as exemplified by claim 1, is seen to encompass an isolated sequence of "at least 20 nucleotides" having "... at least one mutation" wherein the mutation results in the increase in oleic acid levels or decrease in linoleic acid levels in seeds. These claims fail to clearly set forth the metes and bounds of the invention taught in the specification. First, the limitation to 20 nucleotides appears to be an arbitrary size with no direct linkage to the function of the gene or mutation in the gene<sup>1</sup> as the specification clearly disclose that the mutation enabled are those that occur in the amino acid (aa) motif *His Xaa Xaa Xaa His*. Secondly to the person having skill in the art a mutation that affects an *aa* sequence need not affect the *aa* function, such as conservative substitutions or point mutation. Thirdly, while mutations which affect oleic acid levels could be due to modification in the steady state activity of the enzyme encoded, such as down or up regulation, the specification clearly teaches the limitation of mutations to include only those which make the enzyme non-functional. Attention is directed to page 18, where applicants state:

Mutations in any of the regions of the Tables 1-6 are specifically included within the scope if the invention, provided that such mutation (or mutations) renders the resulting desaturase gene product non-functional, as discussed herein above.

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<sup>1</sup> Mutations taught in the specification appear directed to changes in a 5 amino acid motif which would correspond to 15 nucleotides leaving 5 nucleotides unaccounted for and which would not comprise more than 1 additional amino acid.

Finally, all mutations must be defined in terms of what is considered to be the "wild type" of a gene, and in this regard, the specification teaches modifications in the motif "His Xaa Xaa Xaa His" as exemplified by a non-conservative substitution from HECGH to HKCGH (pages 14/15). These modification apparently result in the absence of function of the gene product (page 18) and do not encompass mutations which result in up or down regulation. Accordingly, the claims fail to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 7, 17, 33 and 41 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The claims appear to be improperly dependent in that claim 6 is limited to a modified motif of *aa*'s which comprise a specific *aa* sequence of the plant of claim 5 while the plant of claim 7 comprise a different motif and yet is dependent from the plant of claim 6. It is not clear how the plant of claim 7 could comprise both motifs. Claims 17, 33 and 41 present the same problem of dependency.

Claim 45 is rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The limitation in which said mutant gene confers a "decreased" level of acid in the seed of the invention fails to particularly point out and distinctly claim the subject matter which applicant regards as the invention as there is no reference to what the decreased level is measured to.

Claim 17 is rejected under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, has possession of the claimed invention.

It is apparent that the plant designated as ATCC accession number 40811 is required to practice the claimed invention. As such it must be readily available or obtainable by a repeatable method set forth in the specification, or otherwise readily available to the public. If it is not so obtainable or available, the requirements of 35 USC 112, first paragraph, may be satisfied by a deposit of the plant.

While the instant subject matter is stated to have a ATCC deposit number it is not clear from the specification the conditions of the deposit. If the deposit is made under the terms of the Budapest Treaty,

then an affidavit or declaration by Applicants, or a statement by an attorney of record over his or her signature and registration number, stating that the instant invention will be irrevocably and without restriction released to the public upon the issuance of a patent, would satisfy the deposit requirement made herein. Further, to be considered adequate a deposit should consist of at least 2500 seeds of each claimed embodiment. In instances where the claimed invention consists of sexually unstable material a deposit of the parental material is required if the parental material is considered sexually stable. In lieu of this requirement regenerable clonal material may be deposited to satisfy the specific enablement where the above material cannot be provided. If a deposit has not been made under the Budapest Treaty, then in order to certify that the deposit meets the criteria set forth in 37 CFR 1.801-1.809, Applicant may provide assurance of compliance by affidavit or declaration, or by a statement by an attorney of record over his or her signature and registration number showing that:

- (a) during the pendency of the application, access to the invention will be afforded to the Commissioner upon request;
- (b) all restrictions upon availability to the public will be irrevocably removed upon granting of the patent;
- (c) the deposit will be maintained in a public depository for a period of 30 years, or 5 years after the last request or for the effective life of the patent, whichever is longer;
- (d) a test of the viability of the biological material at the time of deposit (see 37 CFR 1.807); and
- (e) the deposit will be replaced if it should ever become inviable;

*Prior art.*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

- (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-5, 8-9, 11-12, 14-15 and 19-21 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Edwards et al. .

*YH*  
Edwards et al. (WO 94/11516, abstract and sequence analysis) disclose isolated nucleic acid fragments, microsomal gene products and whole genes which comprise at least one mutation<sup>2</sup> in the Δ-12 fatty acid gene. The fatty acid desaturase clone seq. registry no. 158283-28-4 disclose mutations in this motif as *HECGH*, *HRRHHH* and *HVAHH*, while registry no. 158283-32-0 disclose *HDCGH* and *HRRHH* and as such anticipate the claimed invention.

Claims 27-31, 34-36, 38-39 and 42-43 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Browse et al.

Browse et al. (WO93/11245) Browse et al. disclose the presence of the motif *HDCDH*, *HRTHH*, *IIIIHGII*, and *IVVIII* in seq. registry No. 149955-99-7 and *HDCGH*, *HRTHH*, *IIIIHGII* and *IVVIII* in Seq. registry No. 149955-98-6, both isolated from *Brassica napus* Δ-15 fatty acid desaturase which comprise mutations from the claimed motif and as such anticipate the claimed invention.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-5, 8-15, 18-31, 34-39, 42-45 and 55-65 are rejected under 35 U.S.C. § 103 as being unpatentable over Edwards et al. and Browse et al. in view of Pleines et al.

Edwards et al. (WO 94/11516, abstract and sequence analysis) disclose isolated nucleic acid fragments, microsomal gene products and whole genes which comprise at least one mutation in the Δ-12 fatty acid gene in the amino acid motif *His Xaa Xaa Xaa His*, isolated from *Brassica napus* and other plant species. The fatty acid desaturase clone seq. registry no. 158283-28-4 disclose mutations in this motif as *HECGH*, *HRRHHH* and *HVAHH*, while registry no. 158283-32-0 disclose *HDCGH* and *HRRHH*. Browse et al. (WO93/11245) Browse et al. disclose the presence of the motif *HDCDH*, *HRTHH*.

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<sup>2</sup> Corresponds to the motif *His Xaa Xaa Xaa His* that varies from that disclosed as "non-mutant" in the instant disclosure.

*HHHGH*, and *HVIHH* in seq. registry No. 149955-99-7 and *HDCGH*, *HRTHH*, *HHGH* and *HVIHH* in Seq. registry No. 149955-98-6, both isolated from *Brassica napus*  $\Delta$ -15 fatty acid desaturase which comprise variation from the claimed motif. Neither Edwards et al. or Browse et al. disclose the intended detection of the claimed motif as the means of action of fatty acid modification, or the method of mutant selection as that disclosed in the instant application, however the modification of fatty acid content via mutagenesis and selection is taught by Pleines et al. These authors (page 168, left column) disclose that modification in the  $C_{18:1}/C_{18:3}$  oil seed ratio -- via mutagenesis<sup>3</sup> and interspecific crosses -- would lead to improved food value for rapeseed oil. Specific examples of modified oil quality versus that of traditional varieties are presented in Table 1. Critical to both the ability to modify oil quality through conventional breeding or mutagenesis is the heritability of selection for fatty acid content. In this regard Table 4 (page 169) clearly evidences the very high individual  $h^2$  (or broad sense heritability) for palmitic, oleic, Linoleic, linolenic, oleic desaturation ratio and linolenic desaturation ratio.

Accordingly, the prior art of record denotes that the specific claimed mutations in the  $\Delta 1-2$ ,  $\Delta 15$  fatty acid desaturases were known, and that method to select and breed for known heritable variation in fatty acids using mutagenesis and selection. Thus, the claimed invention as a whole was clearly *prima facie* obvious in the absence of a preponderance of the evidence to the contrary.

#### *Summary*

No claim is allowed.

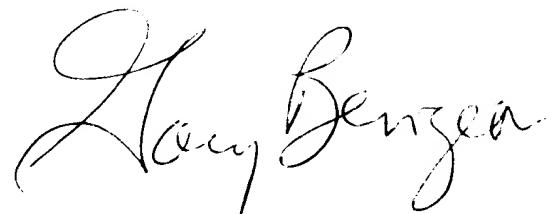
Any inquiry concerning this or earlier communication from the examiner should be directed to **Gary Benzion, Ph.D.** whose telephone number is (703) 308-1119. The examiner can normally be reached on **Monday-Friday from 8 AM to 4:30 PM**. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, **Douglas W. Robinson** can be reached on (703)-308-2897. Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0196.

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<sup>3</sup>Robbelien and Thies. Biosynthesis of seed oil and breeding for improved oil quality of rapeseed, in S. Tsunoda et al. eds. *Brassica Crops and Wild Allies*, Jap. Sci. Soc. Press, Tokyo, 253-283, 1980

Papers related to this application may be submitted to Group 1800 by facsimile transmission. Papers should be faxed to Group 1800 via the PTO Fax Center located in Crystal Mall 1. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989).

Benzion  
12/22/97



**GARY BENZION, Ph.D.  
PRIMARY EXAMINER  
GROUP ART UNIT 1803**

REFERENCE 2: 101:297399

REFERENCE 3: 101:249101

L26 ANSWER 16 OF 36 REGISTRY COPYRIGHT 1997 ACS  
**158283-34-2** REGISTRY  
 CN Desaturase, oleoyl coenzyme A (castor-oil plant clone pRF197C-42 reduced) (9CI) (CA INDEX NAME)  
 OTHER NAMES:  
 CN .delta.-12 Fatty acid desaturase (Ricinus communis clone pRF197C-42)  
 FS PROTEIN SEQUENCE  
 SQL 387

SEQ 1 MGGGRMSTV IISNNSEKKG GSSHLEFAPH TKPPYTLGNL KFAIPPHCFE  
 51 RSFVFSFENF AYNFCIQLPLS YSIATNFFPY ISSPLSYVAW IVYWLFOGCI  
 101 LTGLWVIGHG CGHHAFSEYYQ LADDIVGLIV HSALLVPYFS WKYSHRRHES  
 =====  
 151 NIGSIEERDEV FVVKSHKHN WYSKYLNNPP GRVLTAAATL LLGWFPLYLAF  
 201 NVSGFPYDRF ACHYDPYGPPI FSEFERLQIY IADLGIFATP FVLYQATMAK  
 251 GLAWVMEIYG VPLLIVVNCFL VMITYLQETH PAIERYGSSE WIWLRGAMVT  
 301 VDRDYGVLNK VFHNIAITHV AHHLFATVPH YHAMEATKAI KPTIMEYYFY  
 =====  
 351 DGTPPYKALW FEAKECLFVS PDECAPTOGV FWYERMKY

HITS AT: 109-117, 145-149, 319-323  
 MF Unspecified  
 CI MAN  
 SR CA  
 LC STN Files: CA, CAPLUS  
 1 REFERENCES IN FILE CA (1967 TO DATE)  
 1 REFERENCES IN FILE CAPLUS (1967 TO DATE)

REFERENCE 1: 101:226646

L26 ANSWER 17 OF 36 REGISTRY COPYRIGHT 1997 ACS  
**158283-32-0** REGISTRY  
 CN Desaturase, oleoyl coenzyme A (castor-oil plant clone pFad21 224-amino acid fragment reduced) (9CI) (CA INDEX NAME)  
 OTHER NAMES:  
 CN .delta.-12 Fatty acid desaturase (Ricinus communis clone pRF2-1C)  
 FS PROTEIN SEQUENCE  
 SQL 224

SEQ 1 WVMADCGHH AFSDYQLLDP VVGLLHSCL LVFVFSWKHS HRRHHSNTGS  
 =====  
 51 LERDEVFVPK KKKGQIRWISK YLNNPPGRIM TIAVTLSLGW FLYLAFNVSG  
 101 FPYDFFACHY DPYGFIYNDK ERIEIFISDA GVLAVTFGLY QLAIAKGLAW  
 151 VVCVYGVFLV VVNGFLVLIIT FLQHTHPALP HYDSSEWIWL FGALATVDRD  
 201 YGILNKVFHN ITLTTQVAHHL FTME

HITS AT: 5-9, 41-45  
 MF Unspecified  
 CI MAN  
 SR CA  
 LC STN Files: CA, CAPLUS  
 1 REFERENCES IN FILE CA (1967 TO DATE)  
 1 REFERENCES IN FILE CAPLUS (1967 TO DATE)

REFERENCE 1: 101:226646

L26 ANSWER 18 OF 36 REGISTRY COPYRIGHT 1997 ACS  
**158283-30-8** REGISTRY  
 CN Desaturase, oleoyl coenzyme A (corn clone pFad21 reduced) (9CI) (CA INDEX NAME)  
 OTHER NAMES:  
 CN .delta.-12 fatty acid desaturase (Zea mays clone pFad2#1)  
 KATHLEEN FULLER BT/LIBRARY 308-4290

## IN SEQUENCE

1 MGAGGRMTEK EREKQEQLAF ATGGAAMQRS PVEKPPFTLG QIKKAIIPPHC  
 51 FERSVLKSFS YVVHDLVIAA ALLYFALAIII PALPSFLRYA AWPLYWIAQG  
 101 CVCTGVWVIA HECGHHAFSD YSLIIDDVGL VLHSSLMVPY FSWKYSHRH  
 =====  
 151 HSNTGSLEPD EVFVPKKKEA LPWYTPYVYN NPVGFVVHIV VQLTLGWFLY  
 =====  
 201 LATNASGFPY PFFACHFDPY GPIYNDRERA QIFVSLAGVV AVAFGLYKLA  
 251 AAFGVWWVVP VYAVPLLIVI AWLVLITYLQ HTHPSLPHYD SSEWDWLFGA  
 301 LATMDREYGI LMPVVFHNITD THVAHHLFST MPHYHAMEAT KAIRPILGDY  
 =====  
 351 YHFDPTFVAK ATWFEAGECI YVEPEDRKGV FWYNKHF

S AT: 111-115, 147-151, 321-326

Unspecified

MAN

CA

STN Files: CA, CAPLUS

1 REFERENCES IN FILE CA (1967 TO DATE)  
 1 REFERENCES IN FILE CAPLUS (1967 TO DATE)

REFERENCE 1: 121:226646

L26 ANSWER 19 OF 36 REGISTRY COPYRIGHT 1997 ACS

RN 158283-28-4 REGISTRY

CN Desaturase, oleoyl coenzyme A (soybean clone pSF2-165K reduced)  
 (9CI) (CA INDEX NAME)

OTHER NAMES:

CN .delta.-12 Fatty acid desaturase (Glycine max clone pSF2-165K)

FS PROTEIN SEQUENCE

SQL 379

SEQ 1 MGGRGRVAKV EVQGKKPLSR VPNTKPPFTV GQLKKAIPPH CFQRSLLTSF  
 51 SYVYDLSFA FIFYIATTYF HLLPQPFSLI AWPIYWVLQG CLLTGVWVIA  
 101 HECGHHAFSK YQWVDDVVGL TLHSTLLVPY FSWKISHRFH HSNTGSLDFD  
 =====  
 151 EVFVPKPKSK VAWFSKYLLN PLGRAVSLLV TLTIGWPMYL AFIVSGFPYD  
 201 SFASHYHPIA PIYSNRERLL IYVSDVALFS VTYSLYFVAT LKGLVWLLCV  
 251 YGVPLLIVING FLVTITYLQH THFALPHYDS SEWDWLKGAL ATMDRDYGIL  
 301 NKVFHHITDT HVAHHLFSTM PHYHAMEATN AIKPILGEYY QFDDTPFYKA  
 =====  
 351 LWREAFCILY VEPDEGTSEK GVYWYRNKY

HITS AT: 101-105, 137-141, 311-315

MF Unspecified

CI MAN

SR CA

LC STN Files: CA, CAPLUS

1 REFERENCES IN FILE CA (1967 TO DATE)  
 1 REFERENCES IN FILE CAPLUS (1967 TO DATE)

REFERENCE 1: 121:226646

L26 ANSWER 20 OF 36 REGISTRY COPYRIGHT 1997 ACS

RN 158283-26-2 REGISTRY

CN Desaturase, oleoyl coenzyme A (Brassica napus clone pCF2-165D  
 reduced) (9CI) (CA INDEX NAME)

OTHER NAMES:

CN .delta.-12 Fatty acid desaturase (Brassica napus clone pCF2-165D)

FS PROTEIN SEQUENCE

SQL 383

SEQ 1 MGAGGRMQLVS PPSKKSETDN IKRVP CETPP FTVGELKKAI PPHCFKRSIP  
 51 ESFSHLIWDI IIASCFFYYVA TTYFPLLPNP LSYFAWFLYW ACQGCVLTGV  
 KATHLEEN FULLER BT/LIBRARY 308-4290

BENZION 08/57.2027

1 REFERENCES IN FILE CA (1967 TO DATE)  
 1 REFERENCES IN FILE CAPLUS (1967 TO DATE)

REFERENCE 1: 119:153376

L26 ANSWER 31 OF 36 REGISTRY COPYRIGHT 1997 ACS  
 RN 149955-98-6 REGISTRY  
 CN Desaturase, fatty acid .DELTA.15- (Brassica napus clone pBNSE3-f2  
 C-terminal fragment reduced) (9CI) (CA INDEX NAME)  
 OTHER NAMES:  
 CN .DELTA.-15 glycerolipid desaturase (Brassica napus clone pBNSE3-2  
 microsomal)  
 FS PROTEIN SEQUENCE  
 SQL 378

SEQ 1 LTVESSSSPP IEEEFITQHF DPGAPPFNL AIIFFAIPKH CWVKNPWHSM  
 51 SYVVFELAIV FALAKGAAYL NNWLWFLYW IAGCTMFVAL FVLGHDCGHC  
 101 SFSNDPPLNS VVGHLLHSSI LPVYHGWRIS HPTHHQDHGH VENDESWHPM  
 151 SEKIYKSLDK PTEFFFTLPL LVMLAYFFYL WAFFSGMKGS HYHPDSDLFL  
 201 PKERNIDVLTS TACWTAMAVL LVCLNFVMGP MMLKLYVIP YWINVMWLEF  
 251 VTYLHHHGHE EKLPWTFGKE WSYLRGGLT TTYFVGLINN IHHDIGTHVI  
 301 HHLPQIIPHY HLVATEAAK PVLGKYYFEP DSGPLPLHL LGILAKSIKE  
 ==  
 351 DHFVSDEGDV VYYEADPNLY GEIKVTAE  
 HITS AT: 95-99, 131-138, 255-259, 298-302  
 MF Unspecified  
 CI MAN  
 SR CA  
 LC STN Files: CA, CAPLUS, TOXLIT  
 1 REFERENCES IN FILE CA (1967 TO DATE)  
 1 REFERENCES IN FILE CAPLUS (1967 TO DATE)

REFERENCE 1: 119:153376

L26 ANSWER 32 OF 36 REGISTRY COPYRIGHT 1997 ACS  
 RN 149955-97-5 REGISTRY  
 CN Desaturase, fatty acid .DELTA.15- (Arabidopsis thaliana clone  
 pACF2-2 reduced) (9CI) (CA INDEX NAME)  
 OTHER NAMES:  
 CN .DELTA.-15 fatty acid desaturase (Arabidopsis thaliana clone pACF2-2  
 plastid)  
 CN .omega.-3 fatty acid desaturase (Arabidopsis thaliana chloroplast  
 clone CFD gene fadD precursor)  
 CN .omega.-3-Fatty acid desaturase (Arabidopsis thaliana clone q45)  
 FS PROTEIN SEQUENCE  
 SQL 446

SEQ 1 MAMLVLSCEG IIPILFRIYTT PFSNFLSNMM KFRPSLSSSS YKTSSSPLSF  
 51 GLNSFDGFTR NWALNVSTPL TTEFHEESPL EEDNKQRFDP GAPPFFNLAD  
 101 IRAAIPKHEW VKNFWKSLSY VVFLWAIVFA LAAGAAYLNN WIVWELIYWL  
 151 QGTMFVALFV IGHDCGHGSF SNDPKLNSVV GHLLHSSILV PYHGWRISH  
 201 THHQNHHGHE NLESWHPMSE KIVNTLEKPT RFFFFFTLPLV MLAYPFYLWA  
 251 RSPGKKGSHY HFDSDLFLPK ERKEVLTSTA CWTAMAALLV CLNFTIGPIQ  
 301 MLKLYGIPYW JINVMWLDFVT YLHHHGHEF LPWYRGKEWS YLFGQLTTLD  
 351 RDYGLINNIH HDIGTHVIIH LFICIPHYHL VVATEAAKPV LGKYYFEPDK  
 401 SGFLPLHLLE ILAKSIKEDH YVSDEGEVVY YKADPNLYGE VKVFA  
 HITS AT: 163-167, 199-206, 323-327, 366-370  
 KATHLEEN FULLEF BT/LIBRARY 308-4290

2: 119:153376

ANSWER 29 OF 36 REGISTRY COPYRIGHT 1997 ACS  
 9956-00-3 REGISTRY  
 Desaturase, fatty acid .DELTA.15- (soybean clone pXF1 reduced) (9CI)  
 (CA INDEX NAME)

NAMES:  
 .DELTA.-15 desaturase (Glycine max clone pXF1 microsomal)  
 .omega.-3 fatty acid desaturase (Glycine max clone GM3 gene fad3)  
 PROTEIN SEQUENCE

380

SEQ 1 MVKDTKPLAY AANNGYQQKG SSFDFDPSAP PPFKIAEIRA SIPKHCWVKN  
 51 PWRSLSYVLR DVLVIAALVA AAIKFDNWLL WLIYCPQGT MFWALFVLGH  
 101 DCGHGSFDS PLNNSLVGHI LHSSILVYH GWRISHRTHH QNHGHIEKDE  
 151 SWVPLTEKIIY KNLDMSMTPLI EFTVPPFLFV YPIYLFSPRSP GKEGSHFNPY  
 201 SMLFPPSERK GIAISTLICWA TMFSLLIVLTS FITSPLLVLF LYGIPYWIFV  
 251 MWLDFVTVLH HHHHHQKLPW YRGKEWSYLP GGLTTVDRDY GWIYNIIHDI  
 301 GTHVIHHLFP QIPHYPILVEA TQAAKPVLD YYREPEPESAP LPFHLIKYL  
 351 QSMRQDHFVS DTGDDVVYQT DSLLLHSQRD

HITS AT: 100-104, 136-143, 260-265, 303-307

MF Unspecified  
 CI MAN  
 SE CA  
 LC STN Files: CA, CAPLUS, TOXLIT  
 : REFERENCES IN FILE CA (1967 TO DATE)  
 : REFERENCES IN FILE CAPLUS (1967 TO DATE)

REFERENCE 1: 120:47048

REFERENCE 2: 119:153376

L26 ANSWER 30 OF 36 REGISTRY COPYRIGHT 1997 ACS  
 RN 149955-99-7 REGISTRY  
 CN Desaturase, fatty acid .DELTA.15- (Brassica napus clone pBNSFd-2  
 C-terminal fragment reduced) (9CI) (CA INDEX NAME)  
 OTHER NAMES:  
 CN .DELTA.-15 glycerolipid desaturase (Brassica napus clone pBNSFd-2  
 plastid)  
 FS PROTEIN SEQUENCE  
 SQL 404

SEQ 1 FKFFQSPSSP RFLNSPNWA LNVTTPLTVL SSSSPPIEEE PKTQRFDPGA  
 51 PPPFNLADIR AAIPKHCWVK NPWKSMSYVV RELAIVFALA AGAAYLNNWL  
 101 VWPLYWIAQG TMFWALFVLG HDCGHGSFSN DPFLNSVVGH LLHSSILVYH  
 151 HGWRISSHRT HQNHHGVEND ESWHFMSEKI YKSLDKPTRF FRFTLLEVML  
 201 AYPFYLWARS PGKKGSHYHP DQDLFLPKER NDVLTSTACW TAMAVLLVCL  
 251 NFVMMGPMQML KLYVIFYWIN VMWLFVTVLH HHHGHEDKLP WYRGKEWSYLP  
 301 PGGLTTLDRD YGLINNIIHHD IYTHVIHHLF PQIPHYPILVE ATEAAKPVLD  
 351 KYYREPKSG PLPLHILGIL AKSIKEDHFV SDEGDVVYYE ADPNLYGEIK  
 401 VTAE

HITS AT: 131-129, 157-164, 281-285, 324-328

MF Unspecified

CI MAN

SE CA

LC STN Files: CA, CAPLUS, TOXLIT

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